



Resources and Support for High-Precision Real-Time GNSS Networks

**CGSIC States and Localities Committee
September 26th, 2006 - Fort Worth, TX
Gavin Schrock, PLS**



On-Grid

Goals and Objectives

“To develop, on the national level, a program to assist locally or regionally driven initiatives in the establishment, maintenance, and operation of real-time GPS infrastructure networks to serve the widest possible range of public and private sector interests”



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Goals and Objectives

Resources



Expertise



Policy Assistance



Cooperative Efforts



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Goals and Objectives - NOT

Rules



Big Funding



Public Sector Only



Proprietary Solutions



On-Grid High Precision Real-Time GNSS

Low

- **Recreational**
- **Navigational**
- **Resource Mapping**

3m – 10m

1m – 5m

High

- **Surveying**
- **Monitoring**
- **Construction**
- **Science**

1cm – 0.1m

Reference Stations

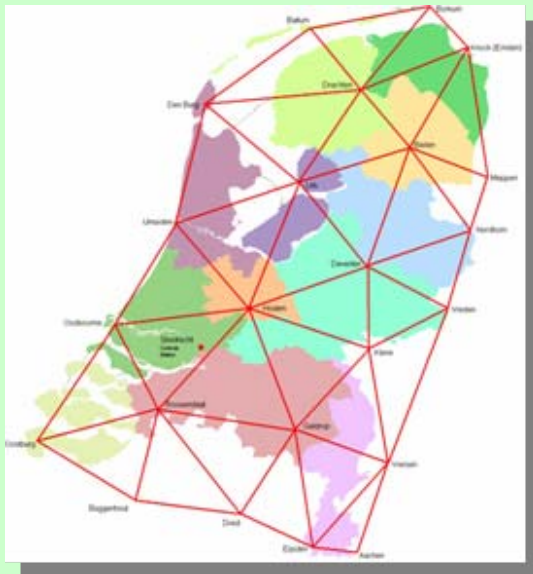
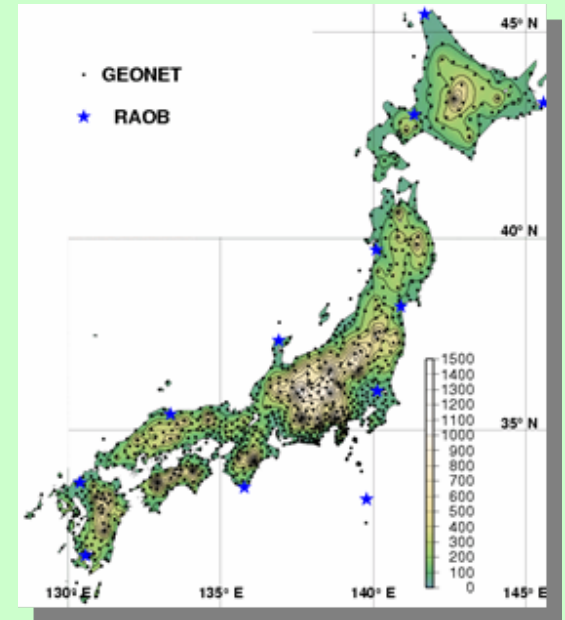




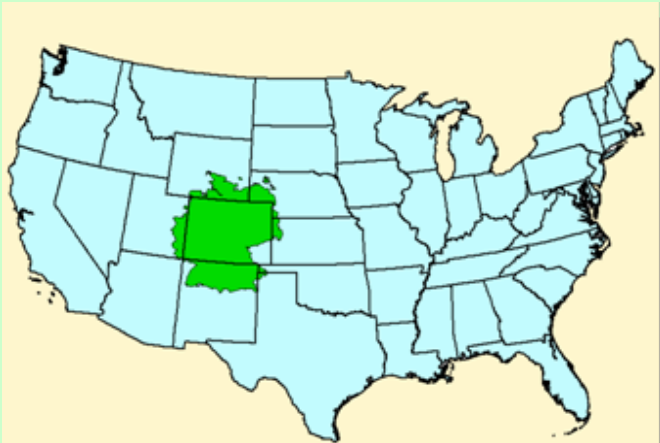
Rovers



Infrastructure Networks



Infrastructure Networks



Infrastructure Networks



Infrastructure Networks

wsrn.org

Washington State Reference Network

A Regional Cooperative of Real-Time GPS Networks.

The Washington State Reference Network is a cooperative of real-time GPS networks offering survey data and real-time GPS correction services for Washington state. GPS data files from a network of *continuously operating reference stations (CORS)* are available for download to all with real-time services available through partnerships, memberships and subscriptions.

Visit www.wsrn.org for more information...



Technology.

"Real-time GPS networks offering survey data and real-time GPS correction services."



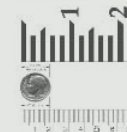
Cooperation.

"Services available through partnerships, memberships and subscriptions."



Precision.

"Users achieve high accuracy location on the order of centimeters in seconds."



Resources



Bundesamt für
Kartographie und Geodäsie



RTCM

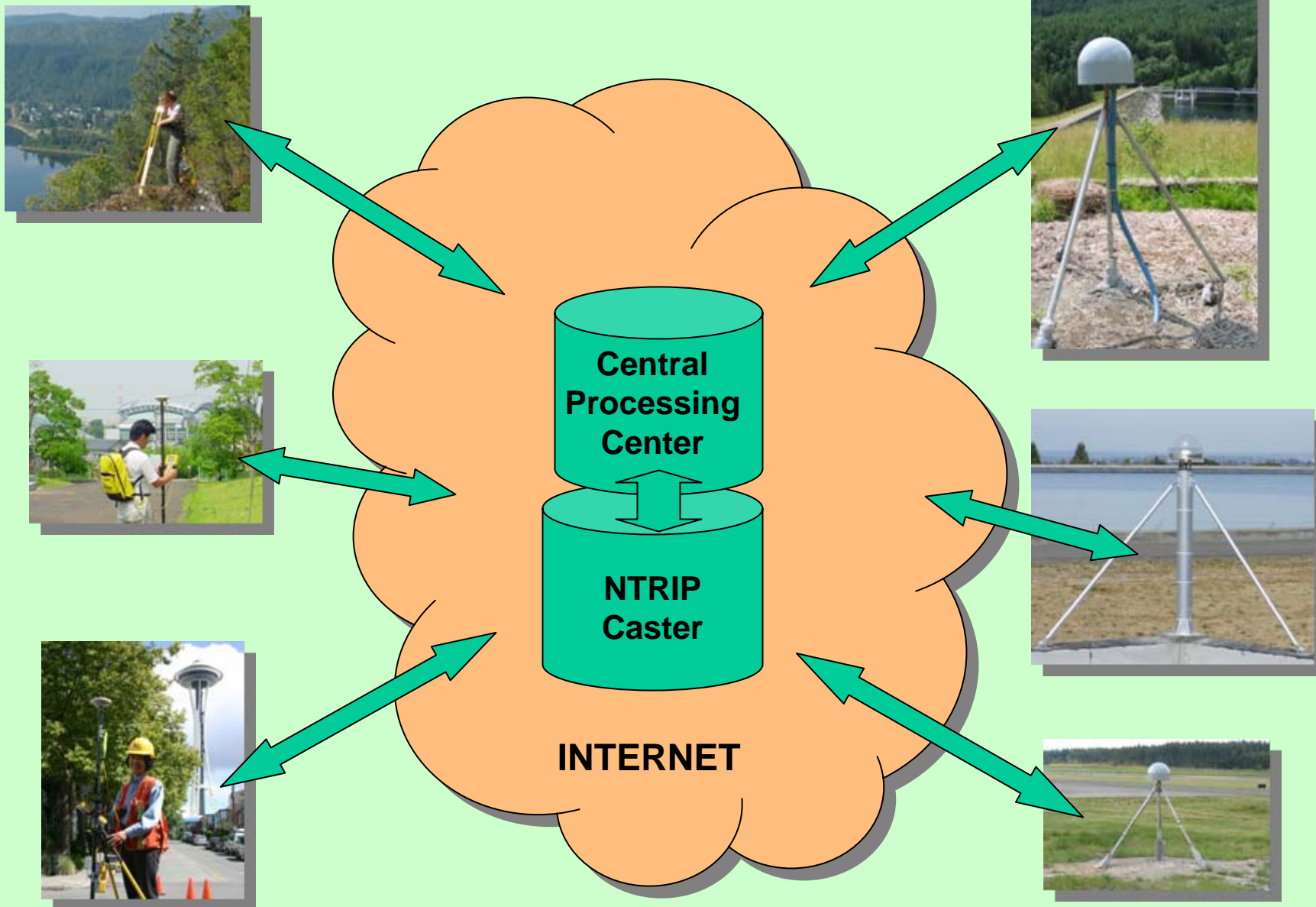
The Radio Technical Commission for Maritime Services



National Oceanic and Atmospheric Administration

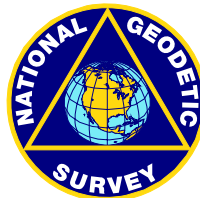


Resources



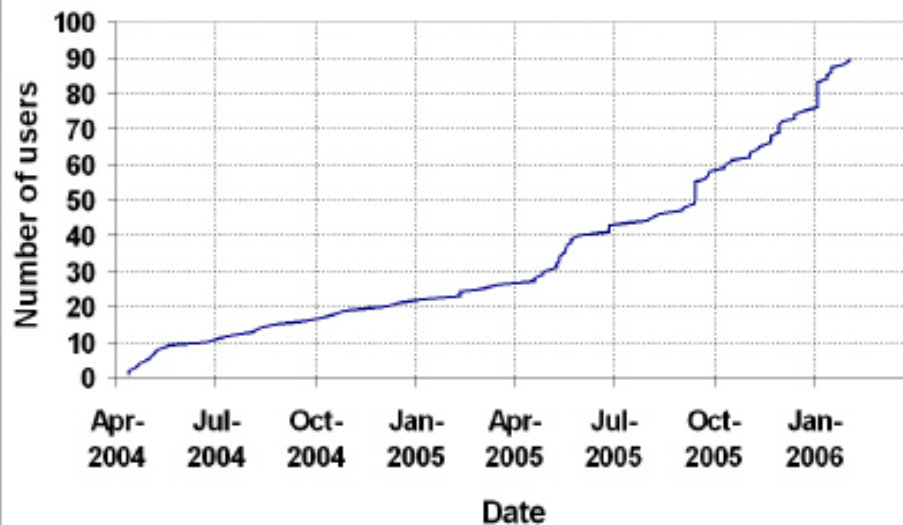
Drivers for Network Development

- Sustainable Development
- Scientific & Academic
- Geodesy & Survey
- Resource Management
- Asset Management
- Cadastral & Commercial

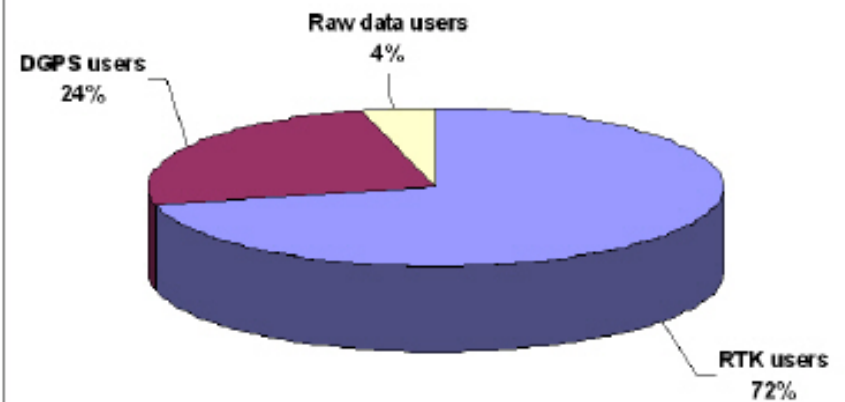


User Segment

Number of registered real-time data users



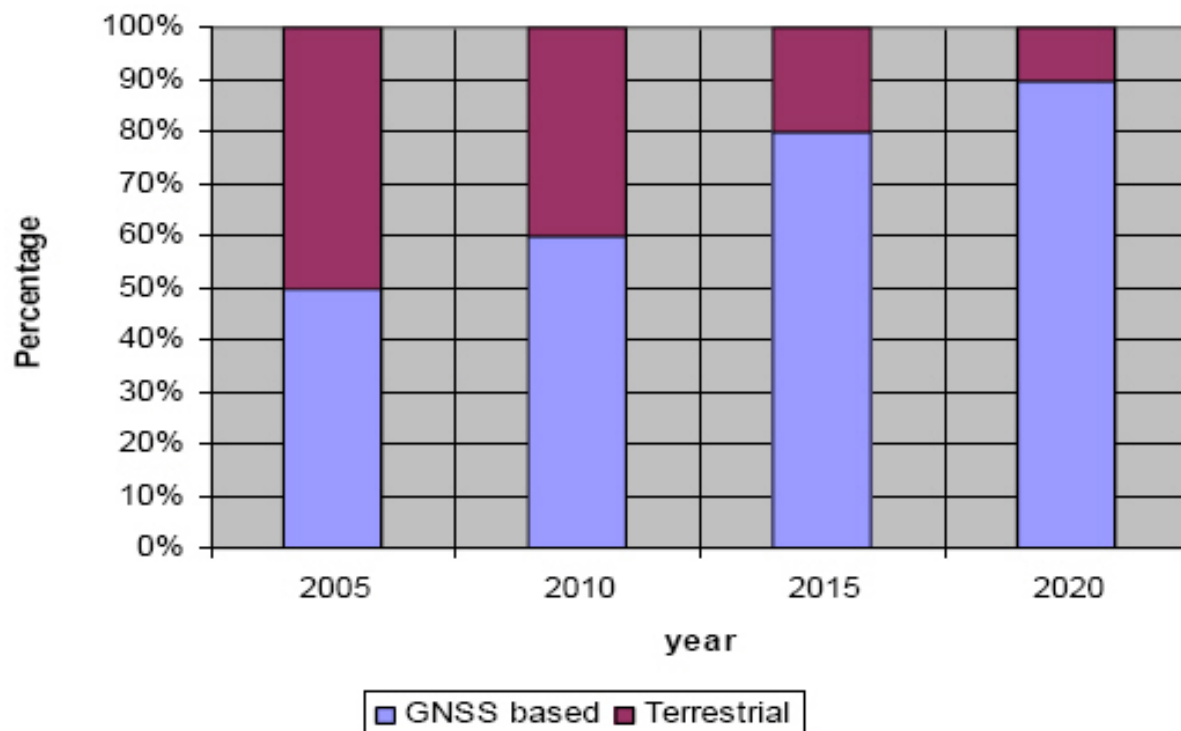
RTK vs. DGPS users



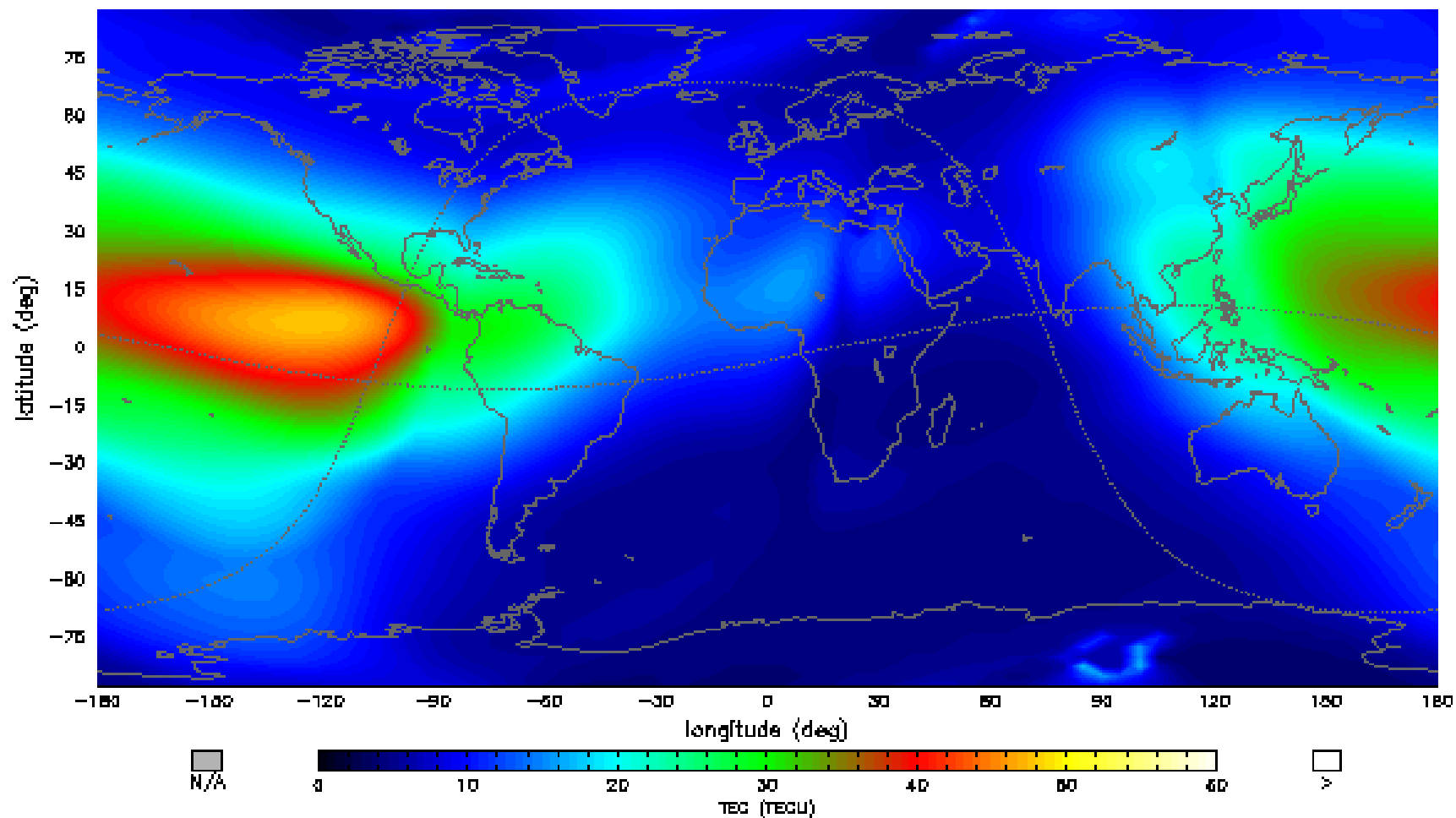
GIGA –

Results from interviews in the energy community

Evolution of GNSS based surveying



TEC MAP (height= 450.0 km) at 1998/07/16,01:00:00
esa/esaac CP: vertical integration over Chapman Profile model 49 stat

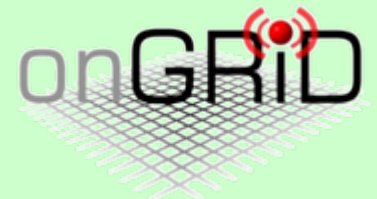


On-Grid Infrastructure as an Amenity for all...

RTN establish 1000's of new CORS...



- **Additions to the national CORS**
- **Better modeling**
- **Other augmentation systems benefit from modeling**
- **More data for scientific community**
- **Vendors sell more rovers!**
- **Yeeha!**



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2005 – Early Objectives Identified



- **Support Real-Time GPS Initiatives Across the Nation**
- **Support Public Safety and Commerce**
- **Resources for Public and Commercial Networks**
- **Address Duplicity of Effort**
- **Vendor Solution Independent**
- **Support Current National Positioning Programs**



On-Grid 2005-2006 Forums



- **American Congress Surveying & Mapping - ACSM**
- **National Society of Professional Surveyors - NSPS**
- **Real-Time Network (RTN) Administrators**
- **Local and State Industry Associations**
- **2006 NGS CORS Forum @ CGSIC**
- **International NTRIP Symposium (BKG)**
- **Trade/User Conferences**
- **Individuals have contacted their representatives**

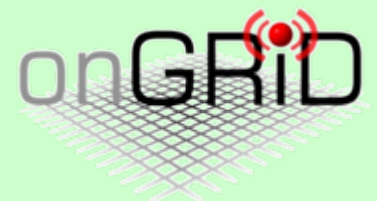


On-Grid Issues Facing RTN Developers

Geodesy - Reference Framework



- Little Local or Regional Expertise
- Higher Precision, New Considerations
- Migration from Legacy Reference Systems



On-Grid Issues Facing RTN Developers



Expertise & Education



- Little Local or Regional Expertise
- Few publications
- No risk assessments
- Infrastructure developed without considering RN utility
- Little outreach
- Few applicable guidelines & standards



On-Grid Issues Facing RTN Developers

Communications & IT



- **Cellular provider function restrictions**
- **Local IT concerns**
- **Risk assessment**
- **Broader acceptance of NTRIP needed**
- **Little outreach**
- **Few applicable guidelines & standards**



On-Grid Issues Facing RTN Developers

Cost-Benefit Analysis



- Few cost-benefit case studies
- Few business model examples
- Difficulty in examining and including other PNT benefits
- Boilerplate cooperative agreements needed
- Big-Ticket public works do not consider RTN utilization



On-Grid Issues Facing RTN Developers

Policy - Bureaucracy



- **Misinterpreted as security risk**
- **Compartmentalized authority/funding**
- **Does not compete with current programs**
- **High Precision little discussed**
- **Locals seek examples/guidance from Fed**



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With dreams begin responsibilities - Yeats



On-Grid Proposed Actions



Programs?

Bill?

Directive?

Bake-Sales?

On-Grid participants have been very effective in articulating their needs, but as somewhat clueless as how to frame a national program..



On-Grid Proposed Actions



- **Open dialogue with cellular providers concerning restrictions to implementation of RTN applications on mobile devices**
- **IT Security Issue Position Papers**



On-Grid Proposed Actions



- **Support NGS role in registration of RTN to Reference Framework...**
- **Guidelines and Standards**



On-Grid Proposed Actions



- **Publications**
- **Academic Studies**
- **Security Issue Position Papers**
- **Application Case Studies**



On-Grid Proposed Actions



- **Raw data stream sharing from existing publicly funded reference stations**
- **Identify public works projects that would benefit from adding to RTN infrastructure**
- **Many federal interests would like to participate in RTN at the local level... can someone give them the OK?**



On-Grid Proposed Actions



- **Cost-Benefit Case Studies**
- **Business Model Examples**
- **Cooperative Agreement Boilerplates**



On-Grid Proposed Actions



- **Outline other PNT Benefits**
- **Support/Develop Outreach**
- **Support NDGPS!**
- **Seek Interface with PNT**



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The On-Grid initiative will continue as a grass roots effort to develop a national program, or lend support to programs that seek to provide resources needed to achieve the same goals



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Most potential RTN participants experience some level of hesitance seeking authorization from above...

Often the higher authorities are simply waiting for the same from even higher authorities...

Sometimes it is as simple as hearing those three magic words:

This is Cool!





The U.S. Department of Commerce

The Space Enterprise Council of the U.S. Chamber of Commerce

The National Space-Based Positioning, Navigation, and Timing Coordination Office

are pleased to host

Next Generation GPS for Enhanced Business Productivity

Because Time is Money, and Location is Everything

Wednesday, January 25, 2006

U.S. Chamber of Commerce

Washington, D.C.

Caterpillar



JOHN DEERE

LOCKHEED MARTIN

Trimble

*More of these types of
events will definitely
help...*





Thank You!

Contact: schrockg@comcast.net

